



## PATENT APPLICATION

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: :  
Koji Shirakawa et al. : Group Art Unit: 1752  
Appln. No.: 10/812,074 : Examiner: LEE, SIN J  
Filed: March 30, 2004 :  
For: POSITIVE RESIST COMPOSITION

DECLARATION UNDER 37 C.F.R. §1.132

Assistant Commissioner for Patents  
Alexandria, VA 22313-1450

Sir:

I, Koji Shirakawa, do declare and state as follows:

I am a citizen of Japan.

I graduated from Shizuoka University, the department of Engineering,  
Course of Applied Chemistry in March 1991.

Since April 1991 I have been employed by Fuji Photo Film Co., Ltd. and  
have been engaged in research and development of photo resist formulations for  
semiconductors at the Yoshida-Minami Factory Research Division of the  
company.

I am a co-inventor of the invention described and claimed in the  
above-named application, and I am familiar with the subject matter disclosed by  
the application as well as the Office Action dated March 7, 2006 concerning the  
application.

In order to demonstrate the unexpected superiority of the present  
invention, the following experimentation was conducted by me or under my

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supervision.

### EXPERIMENTATION

Example 9 in the working examples of Nishiyama et al (US 6,537,718 B2 (hereafter Nishiyama et al '718)) which uses an alkali-soluble resin B-5 obtained from a base resin having a weight average molecular weight of 17,000 was evaluated by the same ways as described in the present application (shown as Comparative Example 1' in Table A and Table B below). In Example 1 and 2 in Table A below, an alkali-soluble resin B-5' and an alkali-soluble resin B-5'' were prepared respectively based on the working examples of the present invention by using a base resin having a weight average molecular weight of 2,500 and a base resin having a weight average molecular weight of 4,000 in place of the base resin having a weight average molecular weight of 17,000. Each of the alkali-soluble resin B-5' and the alkali-soluble resin B-5'' obtained from the base resin having a weight average molecular weight of 2,500 and the base resin having a weight average molecular weight of 4,000 respectively has a weight average molecular weight nearly equal to that of its base resin. Therefore, the alkali-soluble resin B-5' and the alkali-soluble resin B-5'' fall into the claimed range of a weight average molecular weight. Example 1 and 2 were also evaluated by the same ways as described in the present application. The evaluation results were shown in Table B.

Table A

		Alkali-Soluble Resin	Photo-Acid Generator	Additive	Surface Active Agent	Solvent
Comparative Example 1'	Nishiyama et al '718 Example 9	B-5 (Base Resin 17,000)	D-1	E-2	F-1	S1/S4
Example 1		B-5' (Base Resin 2,500)	D-1	E-2	F-1	S1/S4
Example 2		B-5'' (Base Resin 4,000)	D-1	E-2	F-1	S1/S4

Table B

		Sensitivity ( $\mu\text{C}/\text{cm}^2$ )	Resolution ( $\mu\text{m}$ )	Pattern Profile	In vacuo PEB Property (nm)
Comparative Example 1'	Nishiyama et al '718 Example 9	6.5	0.14	slight taper	2.4
Example 1		5.0	0.10	rectangle	2.1
Example 2		5.5	0.10	rectangle	2.0

As clearly seen from Table B, Example 1 and 2 of the present invention are excellent in each of sensitivity, resolution, patter profile and in vacuo PEB property, which are effects of the present invention and not described in Nishiyama et al '718, as compared with Comparative Example 1'.

That is, the present invention achieves particularly specific effects as described in the specification by selecting a specific molecular weight and a specific ratio of acid decomposable groups of the polymer having a group represented by formula (X). The technical ideas of the present invention and Nishiyama et al '718 are different, thus the present invention and Nishiyama et al '718 differ in objects to be solved and effects. In view of above, the present

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invention is not obvious from Nishiyama et al '718.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectively submitted,

Date: May 26, 2006

Koji Shirakawa

Koji Shirakawa

**Atofina v. Great Lakes Chemical Corp.**

**U.S. Court of Appeals  
Federal Circuit**

No. 05-1359

Decided March 23, 2006

**PATENTS****[1] Patent construction — Claims —  
Broad or narrow (§ 125.1303)****Patent construction — Claims — Defin-  
ing terms (§ 125.1305)**

Federal district court, in construing term “chromium catalyst” in claims for method of synthesizing difluoromethane, properly relied on scientific and technical dictionaries to construe ordinary and customary meaning of “catalyst” as “a substance that alters the velocity of a chemical reaction without being consumed,” since there is no suggestion that intrinsic record defines “catalyst,” and it is therefore proper to look to technical dictionaries for assistance in determining term’s meaning to person of ordinary skill in art.

**[2] Patent construction — Prosecution his-  
tory estoppel (§ 125.09)****Patent construction — Claims — Broad  
or narrow (§ 125.1303)****Patent construction — Claims — Defin-  
ing terms (§ 125.1305)**

Term “chromium catalyst,” as used in claims for method of synthesizing difluoromethane, is properly construed to mean catalyst in which only catalytically active material is chromium, without addition of metal oxides, non-inert additives, or alkali metal fluorides, since specification refers to catalyst as “pure chromium” and as “containing solely chromium,” and states that it is “unnecessary to employ special additives,” since patent applicants’ statements during prosecution, in distinguishing their claimed “bulk or chromium catalyst” over prior art, constitute disclaimer of claim scope as to metal oxides and non-inert additives, and since applicants further stated that their claims “exclude the utilization of an alkali metal fluoride as noted in” prior art reference; applicants’ disclaimers cannot be construed as limited to nickel-chromium catalysts, since fact that applicants

needed to surrender only nickel-chromium catalysts to avoid prior art reference does not mean that disclaimer was limited to that subject matter.

**[3] Infringement — Construction of claims  
(§ 120.03)****Infringement — Literal infringement  
(§ 120.05)**

Federal district court’s judgment that accused method of synthesizing difluoromethane does not meet “chromium catalyst” limitation of asserted patent claims is affirmed, since limitation is properly construed to exclude metal oxides and non-inert additives, since district court did not clearly err in determining that infringement defendant’s catalysts contained several metal oxides including “Agent X” oxide, and since there is no clear error in court’s alternative determination that Agent X, if not catalyst, was non-inert additive.

**[4] Patentability/Validity — Anticipation  
— Identity of elements (§ 115.0704)**

Proposition that earlier species reference anticipates later genus claim does not mean that earlier genus reference anticipates narrower species; in present case, prior art Japanese publication does not anticipate temperature range limitation in claims of patent for method of synthesizing difluoromethane, since prior art reference discloses temperature range of 100 to 500 °C, which is broader than, and fully encompasses, specific range of 330 to 450 °C claimed in patent, since, in view of considerable difference between claimed range and that disclosed in prior art reference, no reasonable fact finder could conclude that prior art describes claimed range with sufficient specificity to anticipate temperature range limitation, since preferred range of 150 to 350 °C in reference, which slightly overlaps range claimed in patent, is not disclosed as species of claimed generic range of 330 to 450 °C, and since disclosure of preferred range in reference does not constitute disclosure of endpoints of that range, and reference therefore does not disclose specific embodiment of claimed temperature range.

**[5] Patentability/Validity — Anticipation — Identity of elements (§ 115.0704)**

Prior art Japanese publication does not anticipate molar ratio and contact times limitations in claims of patent for method of synthesizing difluoromethane, since oxygen to methylene chloride ratio of 0.001 to 1.0 percent disclosed in reference overlaps but does not fall within 0.1 percent to 5.0 percent range claimed in patent, and does not constitute specific disclosure of claimed range, and since contact time limitation in asserted claims, which requires that gas phase mixture of methylene chloride, anhydrous hydrogen fluoride, and oxygen be in contact with catalyst for time between 0.01 and 10 seconds, is not disclosed either expressly or inherently in prior art reference, which recites diameters and lengths of reaction tubes and flow rates in examples, but says nothing about contact times.

**[6] Practice and procedure in Patent and Trademark Office — Prosecution — Duty of candor — Citation of references (§ 110.0903.08)**

**Infringement — Defenses — Fraud or unclean hands (§ 120.1111)**

Infringement defendant failed to prove, by clear and convincing evidence, that applicants for patent on method of synthesizing difluoromethane acted with intent to deceive U.S. Patent and Trademark Office, since applicants' failure to disclose full English translation of prior art Japanese publication is not alone sufficient to infer intent, even if it is assumed that translation went beyond abstract that applicants disclosed to patent examiner, since applicants' statement to PTO that Japanese reference discloses catalyst "containing chiefly chromium oxide and optionally other metal oxides" is consistent with text of full translation of reference, and with abstract, since applicants' statement that person of ordinary skill in art seeking means of fluorinating methylene chloride would not be prompted to consider teachings of Japanese reference was not omission of fact that preferred starting material in reference was methylene chloride, in that seven starting materials disclosed in reference, including methylene chloride, are recited in first column of patent, and since applicants' statement that short "contact time" claimed in patent is not taught in applied ref-

erences does not support inference of intent, in that Japanese reference does not disclose any contact times whatsoever.

**Particular Patents — Chemical — Difluoromethane synthesis**

5,900,514, Requieme, Lacroix, and Lantz, synthesis of difluoromethane, judgment of noninfringement affirmed; judgments of invalidity and unenforceability reversed.

Appeal from the U.S. District Court for the District of Delaware, Robinson, S.J.

Action by Atofina against Great Lakes Chemical Corp. for patent infringement. Plaintiff appeals from judgment holding patent in suit not infringed, invalid, and unenforceable. Judgment of noninfringement affirmed; judgments of invalidity and unenforceability reversed. Dyk, J., concurring in part and dissenting in part in separate opinion.

Thomas G. Rowan, Daniel L. Malone, Eric C. Stops, and Gasper J. LaRosa, of Jones Day, New York, N.Y., for plaintiff-appellant.

Richard D. Harris and Brad R. Bertoglio, of Greenberg Traurig, Chicago, Ill., for defendant-appellee.

Before Lourie, Rader, and Dyk, circuit judges.

**Lourie, J.**

Atofina appeals from the final decision of the United States District Court for the District of Delaware granting judgment in favor of Great Lakes Chemical Corporation ("Great Lakes") that Great Lakes did not literally infringe U.S. Patent 5,900,514 (the "'514 patent"); claims 1, 2, 6, 7, 9, and 10 of the '514 patent were anticipated by Japanese publication 51-82206 ("JP 51-82206"); and the '514 patent was unenforceable because of inequitable conduct. *Atofina v. Great Lakes Chem. Corp.*, Civ. No. 02-1350 (D. Del. March 23, 2005) ("Final Judgment"). We affirm the district court's claim construction of the term "chromium catalyst" and hence its determination of no literal infringement. However, because the district court clearly erred in finding that JP 51-82206 was an anticipatory reference meeting all the limitations of claims 1, 2, 6, 7, 9, and 10 of the '514 patent and also clearly erred in finding that the applicants of the patent intended to deceive the United

States Patent and Trademark Office, we reverse its holdings of invalidity of anticipation and unenforceability of inequitable conduct.

**BACKGROUND**

The '514 patent is entitled "'514 Difluoromethane,'" and was issued to Great Lakes Chemical Corp., which subsequently became an assignee. The invention is directed to a method of synthesizing difluoromethane ( $\text{CH}_2\text{F}_2$ ) through the gas phase fluorination of methylene chloride ( $\text{CH}_2\text{Cl}_2$ ) with hydrogen fluoride (HF), in the presence of a chromium catalyst, within a particular range, and with a chromium catalyst. Claim 1 requires that the process be conducted in the presence of 0.1 to 1.0 moles of oxygen per 100 moles of methylene chloride at a temperature of between 330°C and 350°C with a "bulk or supported chromium catalyst." '514 patent, col. 7, ll. 20-21. Claim 1 further asserts claims, 2, 5, 6, 7, 9, and 10, which add further limitations: claim 2 adds the range of oxygen to methylene chloride ratios; claim 6 adds a requirement that methylene chloride, oxygen, and hydrogen fluoride be in contact with the catalyst for a time between 0.01 and 10 seconds; claim 7 adds a pressure limitation requiring between 10 and 20 bars absolute; claim 9 is similar to claim 1 but with a different transition metal catalyst and claim 10 is the same as claim 1 but with the addition of the contact time limitation from claim 6. *Id.*, col. 7, ll. 26-27, 3-11, 14-28.

In 1993, Great Lakes began producing difluoromethane using a mixed catalyst consisting of a chromium compound and another element that the district court found as Agent X,<sup>1</sup> carried out in the presence of 1.2 moles of oxygen per 100 moles of methylene chloride, at a temperature of 350°C, and at a pressure between 10 and 20 bars absolute. *Atofina v. Great Lakes Chem. Corp.*, Civ. No. 02-1350, slip op. at 10 (Del. Feb. 23, 2005) ("Opinion"). The catalysts in the process are in contact with methylene chloride for approximately 10 seconds. Agent X apparently enhances the rate of Great Lakes' fluorination reaction as the catalyst life, but the process

<sup>1</sup> Throughout this opinion, we will refer to the catalyst of Great Lakes' proprietary catalyst as Agent X.

not support inference of intent, ese reference does not disclose mes whatsoever.

### Patents — Chemical — methane synthesis

Requieme, Lacroix, and Lantz, difluoromethane, judgment of ent affirmed; judgments of inval- nforceability reversed.

m the U.S. District Court for the elaware, Robinson, S.J.

Atofina against Great Lakes orp. for patent infringement. deals from judgment holding not infringed, invalid, and unen- dgment of noninfringement af- ments of invalidity and unen- reversed. Dyk, J., concurring, in enting in part in separate opinion. . Rowan, Daniel L. Malone, Eric l Gasper J. LaRosa, of Jones Day, l Y., for plaintiff-appellant.

. Harris and Brad R. Bertoglio, of Taurig, Chicago, Ill., for pellee.

curie, Rader, and Dyk, circuit

peals from the final decision of States District Court for the Dis- ware granting judgment in favor es Chemical Corporation ("Great Lakes did not literally in- Patent 5,900,514 (the "'514 uims 1, 2, 6, 7, 9, and 10 of the vere anticipated by Japanese pub- 32206 ("JP 51-82206"); and the was unenforceable because of in- nduct. *Atofina v. Great Lakes* 2., Civ. No. 02-1350 (D. Del. 005) ("Final Judgment"). We af- trict court's claim construction of hromium catalyst" and hence its n of no literal infringement. How- e the district court clearly erred in JP 51-82206 was an anticipatory eeting all the limitations of claims and 10 of the '514 patent and also l in finding that the applicants of intended to deceive the United

States Patent and Trademark Office ("PTO"), we reverse its holdings of invalidity because of anticipation and unenforceability because of inequitable conduct.

### BACKGROUND

The '514 patent is entitled "Synthesis of Difluoromethane," and was issued to Elf Atochem, which subsequently became Atofina, as assignee. The invention is directed to a method of synthesizing difluoromethane ( $\text{CH}_2\text{F}_2$ ) through the gas phase fluorination of methylene chloride ( $\text{CH}_2\text{Cl}_2$ ), with hydrogen fluoride (HF), in the presence of an amount of oxygen ( $\text{O}_2$ ), within a particular temperature range, and with a chromium (Cr) catalyst. Claim 1 requires that the process be conducted in the presence of 0.1 to 5 moles of oxygen per 100 moles of methylene chloride, at a temperature of between 330 and 450 °C, with a "bulk or supported chromium catalyst." '514 patent, col. 7, ll. 20-25. The remaining asserted claims, 2, 5, 6, 7, 9, and 10, add further limitations: claim 2 further narrows the range of oxygen to methylene chloride ratios; claim 6 adds a requirement that the methylene chloride, oxygen, and hydrogen fluoride be in contact with the catalyst for a time between 0.01 and 10 seconds; claim 7 adds a pressure limitation requiring between 1 and 20 bars absolute; claim 9 is the same as claim 1 but with a different transition phase; and claim 10 is the same as claim 1 but with the addition of the contact time limitation from claim 6. *Id.*, col. 7, ll. 26-27, col. 8, ll. 3-11, 14-28.

In 1993, Great Lakes began manufacturing difluoromethane using a mixed metal catalyst consisting of a chromium compound with another element that the district court referred to as Agent X,<sup>1</sup> carried out in the presence of 1.1 to 1.2 moles of oxygen per 100 moles of methylene chloride, at a temperature of 150 to 350 °C, and at a pressure between 5.5 and 7.6 bars absolute. *Atofina v. Great Lakes Chem. Corp.*, Civ. No. 02-1350, slip op. at 18 (D. Del. Feb. 23, 2005) ("Opinion"). The reactants in the process are in contact with the catalyst for approximately 10 seconds. *Id.* Agent X apparently enhances the selectivity of Great Lakes' fluorination reaction, as well as the catalyst life, but the process would not

<sup>1</sup> Throughout this opinion, we will refer to a component of Great Lakes' proprietary catalyst formulation as Agent X.

work in the absence of chromium. *Id.*, slip op. at 18, 20.

On July 1, 2002, Atofina filed a complaint in the United States District Court for the District of Delaware accusing Great Lakes of infringing of the '514 patent. Great Lakes filed an answer and a counterclaim, alleging noninfringement, invalidity, and unenforceability because of inequitable conduct. After a bench trial, the court concluded that (1) Great Lakes did not infringe the '514 patent; (2) claims 1, 2, 6, 7, 9, and 10 were anticipated by JP 51-82206; (3) claim 5 of the '514 patent would not have been obvious in view of the prior art; (4) the '514 patent was not invalid for lack of enablement or failure to disclose the best mode; and (5) the '514 patent was unenforceable because of inequitable conduct. *Id.*, slip op. at 68. The court's holdings as to infringement, invalidity because of anticipation, and unenforceability because of inequitable conduct are at issue in this appeal.

First, the district court relied on the specification, the prosecution history, and dictionaries to construe the term "chromium catalyst" to mean "a substance that alters the velocity of a chemical reaction without itself being consumed, where the only catalytically active material is chromium without the addition of metal oxides, alkali metal fluorides, or non-inert additives." *Id.*, slip op. at 28-29. The court then determined that Great Lakes' catalyst did not meet the "bulk or supported chromium catalyst" limitation because it contained a non-chromium substance, Agent X, that was catalytically active or at the very least a non-inert additive that had been disclaimed in the specification. *Id.*, slip op. at 35-36. In addition, the court found that Great Lakes' catalyst contained a metal oxide other than chromium oxide that had been disclaimed by the applicants of the '514 patent during prosecution. *Id.*, slip op. at 36-37.

Second, the district court held that claims 1, 2, 6, 7, 9, and 10 were anticipated by JP 51-82206. *Id.*, slip op. at 39-45. Relying on *Titanium Metals Corporation v. Banner*, 778 F.2d 775, 782 [227 USPQ 773] (Fed. Cir. 1985), the court determined that the broader temperature range of 100 to 500 °C recited in JP 51-82206 anticipated the narrower temperature range of 330 to 450 °C disclosed in the '514 patent. *Opinion*, slip op. at 41. The court also found that the additional limitation in claim 2, that the oxygen to methylene chloride molar

ratio be between 0.5 percent and 3 percent, was anticipated by JP 51-82206's disclosure of part of that range (0.001 to 1 percent oxygen to methylene chloride molar ratio), again relying on *Titanium Metals*. *Id.*, slip op. at 42. Furthermore, the court determined that although JP 51-82206 does not mention the contact times disclosed in claims 6 and 10, it nevertheless anticipates those claims because the "contact times may be calculated based on the information provided in the examples of JP 51-82206." *Id.*, slip op. at 43-44. The court also held that JP 51-82206 provides an enabling disclosure of the claimed process. *Id.*, slip op. at 45-47.

Finally, the district court held that the '514 patent was unenforceable because of inequitable conduct. *Id.*, slip op. at 58-67. The court first found that the fully translated version of JP 51-82206, which was not submitted to the PTO, was highly material "because it anticipate[d] all the limitations of claims 1, 2, 6, 7, 9, and 10 of the '514 patent." *Id.*, slip op. at 62, 66. The court then determined that Atofina intended to deceive the PTO based on its failure to disclose the full English translation of JP 51-82206, which it had in its possession. *Id.*, slip op. at 64. The court also based its finding of intent on Atofina's alleged misrepresentations to the PTO that JP 51-82206 disclosed a catalyst containing "chromium oxide and optionally other metal oxides" without mentioning that JP 51-82206 disclosed a catalyst of pure chromium oxide, as well as Atofina's alleged mischaracterizations of JP 51-82206 with respect to the scope of the reference and the contact times used in the reference. *Id.*, slip op. at 64-65. After balancing materiality and intent, the court concluded that the '514 patent was unenforceable because of inequitable conduct. *Id.*, slip op. at 67.

The district court entered judgment in favor of Great Lakes on March 23, 2005. Atofina timely appealed, and we have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

### DISCUSSION

Claim construction is an issue of law, *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970-71 [34 USPQ2d 1321] (Fed. Cir. 1995) (en banc), that we review *de novo*, *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1456 [46 USPQ2d 1169] (Fed. Cir. 1998) (en banc). The district court's determination of infringement, in contrast, is a ques-

tion of fact that we review for clear error. *Centricut, LLC v. Esab Group, Inc.*, 390 F.3d 1361, 1367 [73 USPQ2d 1135] (Fed. Cir. 2004). Anticipation is also a question of fact that we review for clear error. *Hoover Group, Inc. v. Custom Metalcraft, Inc.*, 66 F.3d 299, 302 [36 USPQ2d 1101] (Fed. Cir. 1995). Finally, we review a district court's ultimate determination of inequitable conduct for abuse of discretion, and its threshold findings regarding materiality and intent to mislead for clear error. *Brasseler, U.S.A. I, L.P. v. Stryker Sales Corp.*, 267 F.3d 1370, 1379 [60 USPQ2d 1482] (Fed. Cir. 2001). "A finding is 'clearly erroneous' when although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed." *United States v. U.S. Gypsum Co.*, 333 U.S. 364, 395 [76 USPQ 430] (1948).

### I. Infringement

On appeal, Atofina argues that the district court incorrectly construed the term "chromium catalyst." Atofina asserts that the correct construction of "chromium catalyst" is a substance which causes the reaction to take place in which chromium is the catalytically active metal. Atofina also contends that the court erred in excluding all "metal oxides" and "non-inert additives" from the meaning of "chromium catalyst" based on statements in the specification and in the prosecution history. According to Atofina, the court read those statements out of context and they did not amount to a "clear and unmistakable" surrender of subject matter. In addition, Atofina contends that the court misread the Buckman reference, U.S. Patent 3,644,545, in excluding alkali metal fluorides. Atofina then argues that under its construction of "chromium catalyst," Great Lakes' process infringed the '514 patent because the process would not have worked without chromium. Atofina further asserts that the patent covers catalysts made from chromium derivatives, and that the catalyst Great Lakes uses is a chromium derivative.

Great Lakes responds that the district court correctly construed "chromium catalyst" to exclude metal oxides, non-inert additives, and alkali metal fluorides. According to Great Lakes, Atofina disclaimed catalysts containing catalytically active substances other than chromium and catalysts containing non-inert additives. As support for its argument, Great

Lakes points to statements in the specification that the catalyst in the '514 patent is on pure chromium (without the addition of any other metal oxide)" and Atofina's admission in the prosecution history that it was necessary to employ special additives to achieve the selectivity of its catalyst, and claims excluded "utilization of a catalyst, such as that taught by Tsai disclosed a chromium-indium catalyst." Great Lakes then argues that it did not infringe the '514 patent because its catalyst contains chromium X, a catalytically active material, chromium or alternatively a non-chromium.

We agree with Great Lakes that the district court did not err in finding a lack of infringement. Our primary focus in determining infringement is the ordinary and customary meaning of a claim in light of the intrinsic evidence. It is to consider the intrinsic evidence, including the specification and, if in evidence, the prosecution history, from the perspective of a person of ordinary skill in the art. *Phillips v. AIA, Inc.*, 415 F.3d 1303, 1312-17 [75 USPQ2d 1303] (Fed. Cir. 2005) (en banc). At the time of the *Phillips* decision, the Federal Circuit confirmed that courts may consult dictionary definitions when construing claim terms, and that "[d]ictionaries are useful to assist in understanding the commonly understood meaning of words." *Id.* (quoting *Vitronics Corp. v. Vitec, Inc.*, 90 F.3d 1576, 1581 [41 USPQ2d 1573] (Fed. Cir. 1996)). The court also stated, however, that "the court must be sure that any reliance on dictionaries is consistent with the intrinsic evidence: the claim, the specification, and the prosecution history. . . . [I]n those circumstances, reference to dictionaries is appropriate." *Id.* [court's] task is to scrutinize the intrinsic evidence in order to determine the meaning of the claim definition." *Free Motion Fit Cybex Int'l, Inc.*, 423 F.3d 1343, 1348 [62 USPQ2d 1432] (Fed. Cir. 2005) (en banc), 415 F.3d at 1314, 1322-24).

[1] As an initial matter, we conclude that the district court properly relied on the ordinary and technical dictionary definitions and customary meaning of "catalyst" as "a substance that accelerates the rate of a chemical reaction without being consumed." Because there is no dispute that the intrinsic evidence defines "catalyst," one may look to tech-



that we review for clear error. *C v. Esab Group, Inc.*, 390 F.3d [73 USPQ2d 1135] (Fed. Cir. 2005). The question is also a question of fact for clear error. *Hoover Group, m Metalcraft, Inc.*, 66 F.3d 299, [Q2d 1101] (Fed. Cir. 1995). Few a district court's ultimate decision of inequitable conduct for abuse, and its threshold findings of materiality and intent to mislead for *asseler, U.S.A. I, L.P. v. Stryker*, 267 F.3d 1370, 1379 [602] (Fed. Cir. 2001). "A finding is *rebuttable* when although there is evidence to support it, the reviewing court on the whole is left with the definite and firm belief that a mistake has been committed." *United States v. U.S. Gypsum Co.*, 334 F.2d 454, 395 [76 USPQ 430] (1948).

#### Argument

Atofina argues that the district court incorrectly construed the term "chromium catalyst." Atofina asserts that the construction of "chromium catalyst" is incorrect because it causes the reaction to take place where chromium is the catalytically active material. Atofina also contends that the district court excluded all "metal oxides" and "non-inert additives" from the meaning of "chromium catalyst" based on statements made in the prosecution history. In the prosecution history to Atofina, the court read statements out of context and they did not have a "clear and unmistakable" subject matter. In addition, Atofina argues that the court misread the Buckman patent, S. Patent 3,644,545, in excluding fluorides. Atofina then argues that the prosecution history of "chromium catalyst" process infringed the '514 patent because the process would not have worked without chromium. Atofina further asserts that the patent covers catalysts made of chromium derivatives, and that the catalysts made of chromium derivatives uses is a chromium deriva-

Atofina responds that the district court incorrectly construed "chromium catalyst" to include metal oxides, non-inert additives, and fluorides. According to Great Lakes, the district court disclaimed catalysts containing active substances other than chromium and catalysts containing non-inert additives. Atofina supports its argument, Great

Lakes points to statements in the specification that the catalyst in the '514 patent is "based on pure chromium (without the addition of another metal oxide)" and Atofina's assertions in the prosecution history that it was "unnecessary to employ special additives" to increase the selectivity of its catalyst, and that the claims excluded "utilization of a combination catalyst, such as that taught by Tsuji," which disclosed a chromium-indium catalyst. Great Lakes then argues that it did not infringe the '514 patent because its catalyst contains Agent X, a catalytically active material other than chromium or alternatively a non-inert additive.

We agree with Great Lakes that the court did not err in finding a lack of infringement. Our primary focus in determining the ordinary and customary meaning of a claim limitation is to consider the intrinsic evidence of record, *viz.*, the patent itself, including the claims, the specification and, if in evidence, the prosecution history, from the perspective of one of ordinary skill in the art. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-17 [75 USPQ2d 1321] (Fed. Cir. 2005) (en banc). At the same time, *Phillips* confirmed that courts may "rely on dictionary definitions when construing claim terms" and that "[d]ictionaries . . . are often useful to assist in understanding the commonly understood meaning of words." *Id.* at 1322 (quoting *Vitronics Corp. v. Conceptor, Inc.*, 90 F.3d 1576, 1584 n.6 [39 USPQ2d 1573] (Fed. Cir. 1996)). We have also stated, however, that "the court must ensure that any reliance on dictionaries accords with the intrinsic evidence: the claims themselves, the specification, and the prosecution history. . . . [I]n those circumstances where reference to dictionaries is appropriate, the [court's] task is to scrutinize the intrinsic evidence in order to determine the most appropriate definition." *Free Motion Fitness, Inc. v. Cybex Int'l, Inc.*, 423 F.3d 1343, 1348-49 [76 USPQ2d 1432] (Fed. Cir. 2005) (citing *Phillips*, 415 F.3d at 1314, 1322-24).

[1] As an initial matter, we conclude that the district court properly relied on scientific and technical dictionaries to construe the ordinary and customary meaning of the term "catalyst" as "a substance that alters the velocity of a chemical reaction without being consumed." Because there is no suggestion that the intrinsic evidence defines the term "catalyst," one may look to technical dictio-

naries for assistance in determining that term's meaning to a person of ordinary skill in the art. *Phillips*, 415 at 1318 ("Because dictionaries, and especially technical dictionaries, endeavor to collect the accepted meanings of terms used in various fields of science and technology, those resources have been properly recognized as among the many tools that can assist the court in determining the meaning of particular terminology to those of skill in the art of the invention. Such evidence, we have held, may be considered if the court deems it helpful in determining 'the true meaning of language used in the patent claims.'"). The McGraw-Hill Dictionary of Scientific and Technical Terms 307 (4th ed. 1989) defines a catalyst as a "[s]ubstance that alters the velocity of a chemical reaction and may be recovered essentially unaltered in form and amount at the end of the reaction." The district court correctly accepted that ordinary and customary meaning.

[2] Having agreed with the court's definition of the term "catalyst," we also agree with its construction of "chromium catalyst" as a catalyst where the only catalytically active material is chromium without the addition of metal oxides or non-inert additives. The intrinsic record supports that interpretation. The specification states that "it has now been found that there is a temperature range in which a catalyst based on pure chromium (without the addition of another metal oxide) can produce, in the presence of oxygen," difluoromethane. '514 patent, col. 2, ll. 54-59 (emphasis added). The specification further explains that "it is necessary to have a catalyst containing solely chromium." *Id.*, col. 7, ll. 7-12. In addition, the specification makes clear that it is "unnecessary to employ special additives to increase [the fluorination reaction's] selectivity; the elimination of additives employed in the mixed catalysts enables the manufacture of the catalyst to be simplified and thereby its cost to be reduced." *Id.*, col. 3, ll. 10-14. We note that the use of the term "chromium" in the patent includes chromium oxide as it refers to "solely chromium (catalysts A and B)," and catalyst A is chromium oxide. *Id.*, col. 7, ll. 8-9.

The prosecution history confirms a construction of "chromium catalyst" that excludes metal oxides and non-inert additives. As discussed in *Phillips*, the meaning of the claim language may be limited by a dis-

claimer in the specification or prosecution history. 415 F.3d at 1316-17. Here, the applicants' statements in distinguishing their claimed "bulk or chromium catalyst" over prior art are a disclaimer of claim scope as to metal oxides and non-inert additives. The '514 claims were initially rejected on August 6, 1997, as obvious over the prior art. The applicants responded on December 30, 1997, that "the claims recited the phrase 'consisting essentially of' which would exclude the utilization of a combination catalyst, such as that taught by [the Tsuji reference, EP 629440]. Nowhere in the applicants' disclosure is there mentioned a combination of chromium and indium catalyst. Rather the applicants' disclosure in comparative examples 2 and 3 indicates the criticality of utilizing chromium catalyst alone rather than in combination with other metal components." (emphasis added).

The applicants also pointed out that contrary to what might be expected from the prior art, its chromium-based catalyst carried out the fluorination reaction without a decrease in the selectivity of the reaction and that it was "therefore unnecessary to employ special additives to increase its selectivity." The applicants repeated these assertions in their August 20, 1998, response to the PTO's second rejection. In addition, the applicants stated that "pure chromium means without the addition of a metal oxide" and that "[c]ontrary to what might be expected from the prior art, the present invention makes it possible to employ a catalyst based solely on chromium to carry out this fluorination reaction." We thus agree with the district court that the applicants' statements are a disclaimer of claim scope as to catalysts containing metal oxides and non-inert additives. *Phillips*, 415 F.3d at 1317 ("[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be.").

The district court also interpreted "chromium catalyst" as excluding catalysts containing alkali metal fluorides. The basis for the district court's construction as to "alkali metal fluorides" is the applicants' statements in the prosecution history that "[t]he recent claims exclude the utilization of an alkali metal fluoride noted in column 1, line 59 of Buckman, [U.S. Patent 3,644,545]." Buckman, which is

entitled "Improved Vapor Phase Fluorination Procedure in the Presence of Catalyst and Alkali Metal Fluoride," discloses a fluorination reaction "in the presence of a catalyst, when such reaction is carried out in the presence of an alkali metal fluoride." '545 patent, col. 1, ll. 54-59. While the Buckman specification apparently differentiates between the catalyst and the alkali metal fluoride in naming illustrative substances that may be employed as catalysts ( $\text{Cr}_2\text{O}_3$ ,  $\text{CrF}_3$ , and  $\text{AlF}_3$ ) versus alkali metal fluorides (KF and NaF) that should also be present in the reaction, but perhaps not as catalysts, and the applicants may thus have not intended to exclude an alkali metal fluoride as a catalyst, we are not prepared to find error in the district court's exclusion of alkali metal fluorides from its claim construction, as an alkali metal fluoride is clearly in the reference that the applicants were distinguishing. *Id.*, col. 2, ll. 47, 55.

We reject Atofina's argument that the district court erred in its construction of "chromium catalyst" because the applicants' statements regarding "metal oxides" were intended to distinguish only nickel-chromium catalysts, not Agent X-chromium catalysts. That the applicants only needed to surrender nickel-chromium catalysts to avoid a prior art reference does not mean that its disclaimer was limited to that subject matter. "To the contrary, it frequently happens that patentees surrender more through amendment than may have been absolutely necessary to avoid particular prior art. In such cases, we have held the patentees to the scope of what they ultimately claim, and we have not allowed them to assert that claims should be interpreted as if they had surrendered only what they had to." *Norian Corp. v. Stryker Corp.*, 432 F.3d 1356, 1361-62 [77 USPQ2d 1242] (Fed. Cir. 2005) (citing *Fantasy Sports Props., Inc. v. Sportsline.com, Inc.*, 287 F.3d 1108, 1114-15 [62 USPQ2d 1564] (Fed. Cir. 2002)). Here, the patentee spoke expressly to the meaning of "chromium catalyst," both in the specification and in the prosecution history, noting that the catalyst was limited to "pure chromium (without the addition of another metal oxide)." We therefore agree with the district court that Atofina surrendered all catalysts containing non-chromium metal oxides.

[3] Having affirmed the district court's claim construction of the term "chromium catalyst," we also affirm its judgment of non-

infringement. First, the court found "[b]oth the Johnson Matthey report Synetix report demonstrated that deft catalysts contained several metal oxides including Agent X oxide." *Opinion*, slip op. at 36-37. While we have some questions reading the record whether Great Lakes actually contains an Agent X oxide, we nonetheless will defer to the district court's finding of fact on that issue. It is not erroneous. Second, we discern no clear error in the court's alternative determination that Agent X, if not a catalyst, was a non-inert additive. *Id.*, slip op. at 35 n.13. Thus, if the district court made no clear error in finding that Great Lakes did not infringe Atofina's properly construed claims, we affirm the judgment of non-infringement.

## II. Anticipation

On appeal, Atofina argues that JP 51-82206 does not anticipate any claim of the '514 patent because it does not disclose the manufacture of difluoromethane, recited in the preamble of claim 1; its disclosure of a temperature range does not anticipate the specific temperature range claimed in the '514 patent; its disclosure of an oxygen to ethylene molar ratio of 0.001 to 1.0 is not a subset of the claimed range of 0.1 to 5 percent; and it does not disclose the contact time required in claims 6 and 10. According to Atofina, the court's reliance on *Titanium* was misplaced because that case stands for the proposition that a species can anticipate the prior art, not the reverse.

Great Lakes responds that JP 51-82206 anticipates claims 1, 2, 6, 7, 9, and 10 of the '514 patent because the claimed ranges are disclosed in the prior art. According to Great Lakes, JP 51-82206's disclosure of a preferred temperature range of 300 to 350 °C encompasses the temperature range disclosed in the '514 patent of 330 to 400 °C. Great Lakes also contends that JP 51-82206's disclosure of the oxygen to ethylene molar ratios of 0.001 percent to 1.0 percent encompasses the ratios claimed in the '514 patent of 0.1 percent to 5.0 percent. In addition, Great Lakes argues that even though JP 51-82206 does not disclose the contact times as required by claims 6 and 10 of the '514 patent, the contact times are "typical and easily determined through calculation by a person of ordinary skill in the art."

itled "Improved Vapor Phase Fluorination Procedure in the Presence of Catalyst and Alkali Metal Fluoride," discloses a fluorination reaction "in the presence of a catalyst, when the reaction is carried out in the presence of alkali metal fluoride." '545 patent, col. 1, ll. 59. While the Buckman specification apparently differentiates between the catalyst and the alkali metal fluoride in naming illustrative substances that may be employed as catalysts ( $\text{Cr}_2\text{O}_3$ ,  $\text{CrF}_3$ , and  $\text{AlF}_3$ ) versus alkali metal fluorides ( $\text{KF}$  and  $\text{NaF}$ ) that should also be present in the reaction, but perhaps not as catalysts, and the applicants may thus have intended to exclude an alkali metal fluoride as a catalyst, we are not prepared to find error in the district court's exclusion of alkali metal fluorides from its claim construction, as alkali metal fluoride is clearly in the reference that the applicants were distinguishing, col. 2, ll. 47, 55.

We reject Atofina's argument that the district court erred in its construction of "chromium catalyst" because the applicants' statements regarding "metal oxides" were intended to distinguish only nickel-chromium catalysts, not Agent X-chromium catalysts. That the applicants only needed to surrender nickel-chromium catalysts to avoid a prior art reference does not mean that its disclaimer was limited to that subject matter. "To the contrary, it frequently happens that patentees surrender more through amendment than may have been absolutely necessary to avoid particular prior art. In such cases, we have held the patentees to the scope of what they ultimately claim, and we have not allowed them to assert that claims should be interpreted as they had surrendered only what they had." *Norian Corp. v. Stryker Corp.*, 432 F.3d 1356, 1361-62 [77 USPQ2d 1242] (Fed. Cir. 2005) (citing *Fantasy Sports Props., Inc. v. Sportsline.com, Inc.*, 287 F.3d 1108, 1114-15 [2 USPQ2d 1564] (Fed. Cir. 2002)). Here, the patentee spoke expressly to the meaning of "chromium catalyst," both in the specification and in the prosecution history, noting that the catalyst was limited to "pure chromium without the addition of another metal oxide." We therefore agree with the district court that Atofina surrendered all catalysts containing non-chromium metal oxides.

[3] Having affirmed the district court's claim construction of the term "chromium catalyst," we also affirm its judgment of non-

infringement. First, the court found that "[b]oth the Johnson Matthey report and the Syntex report demonstrated that defendant's catalysts contained several metal oxides including Agent X oxide." *Opinion*, slip op. at 36-37. While we have some question from reading the record whether Great Lakes' catalyst actually contains an Agent X oxide, we nonetheless will defer to the district court's finding of fact on that issue. It is not clearly erroneous. Second, we discern no clear error in the court's alternative determination that Agent X, if not a catalyst, was a non-inert additive. *Id.*, slip op. at 35 n.13. Thus, because the district court made no clear error in its finding that Great Lakes did not infringe Atofina's properly construed claims, we affirm its judgment of non-infringement.

## II. Anticipation

On appeal, Atofina argues that JP 51-82206 does not anticipate any claim of the '514 patent because it does not disclose the manufacture of difluoromethane, recited in the preamble of claim 1; its disclosure of a broader temperature range does not anticipate the specific temperature range claimed in the '514 patent; its disclosure of an oxygen to methylene molar ratio of 0.001 to 1.0 is not a disclosure of the claimed range of 0.1 to 5.0 percent; and it does not disclose the contact times required in claims 6 and 10. According to Atofina, the court's reliance on *Titanium Metals* was misplaced because that case stands for the proposition that a species can anticipate a genus, not the reverse.

Great Lakes responds that JP 51-82206 anticipates claims 1, 2, 6, 7, 9, and 10 of the '514 patent because the claimed ranges are within the disclosure of ranges in the prior art. According to Great Lakes, JP 51-82206's disclosure of a preferred temperature range of 150 to 350 °C encompasses the temperature range disclosed in the '514 patent of 330 to 450 °C. Great Lakes also contends that JP 51-82206's disclosure of the oxygen to methylene chloride molar ratios of 0.001 percent to 1.0 percent encompasses the ratios claimed in the '514 patent of 0.1 percent to 5.0 percent. In addition, Great Lakes argues that even though JP 51-82206 does not disclose the contact times as required by claims 6 and 10 of the '514 patent, the contact times are "typically and easily determined through calculation, by a person of ordinary skill in the art."

We agree with Atofina that the district court clearly erred in finding that JP 51-82206 anticipates the '514 patent. Anticipation requires a showing that each limitation of a claim is found in a single reference, either expressly or inherently. *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1367 [77 USPQ2d 1321] (Fed. Cir. 2005). However, each limitation of the '514 claims is not in JP 51-82206. It is well established that the disclosure of a genus in the prior art is not necessarily a disclosure of every species that is a member of that genus. *See, e.g., In re Baird*, 16 F.3d 380, 382 [29 USPQ2d 1550] (Fed. Cir. 1994). There may be many species encompassed within a genus that are not disclosed by a mere disclosure of the genus. On the other hand, a very small genus can be a disclosure of each species within the genus. *In re Petering*, 301 F.2d 676, 682 [133 USPQ 275] (C.C.P.A. 1962); *see also Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1380 [58 USPQ2d 1508] (Fed. Cir. 2001) ("[T]he disclosure of a small genus may anticipate the species of that genus even if the species are not themselves recited."). That is not the case here, however. A temperature range of over 100 degrees is not a small genus and the range of temperatures of JP 51-82206 does not disclose Atofina's temperature range.

[4] To find anticipation here, the district court relied on our opinion in *Titanium Metals*. The court stated that "the '514 patent's claim limitation of 330 to 450 °C is entirely within JP 51-82206's temperature range of 100 and 500 °C. Consequently, this limitation of claim 1 is also disclosed by JP 51-82206." *Opinion*, slip op. at 41. However, *Titanium Metals* stands for the proposition that an earlier species reference anticipates a later genus claim, not that an earlier genus anticipates a narrower species. 778 F.2d at 782. Here, the prior art, JP 51-82206, discloses a temperature range of 100 to 500 °C which is broader than and fully encompasses the specific temperature range claimed in the '514 patent of 330 to 450 °C. Given the considerable difference between the claimed range and the range in the prior art, no reasonable fact finder could conclude that the prior art describes the claimed range with sufficient specificity to anticipate this limitation of the claim. Because the court's determination that JP 51-82206 disclosed the temperature range in claims 1, 2, 6,

7, 9, and 10 of the '514 patent was grounded in its erroneous application of *Titanium Metals*, we must reverse its finding of anticipation based on the temperature range.

Further, we reject Great Lakes' argument that the district court's finding of anticipation was correct because JP 51-82206 discloses a preferred embodiment using a specific temperature range (a species) that anticipates the '514 patent's claim of a broader temperature range (a genus). JP 51-82206 discloses a preferred temperature range of 150 to 350 °C that slightly overlaps the temperature range claimed in the '514 patent. But that slightly overlapping range is not disclosed as such, i.e., as a species of the claimed generic range of 330 to 450 °C. Moreover, the disclosure of a range of 150 to 350 °C does not constitute a specific disclosure of the endpoints of that range, i.e., 150 °C and 350 °C, as Great Lakes asserts. The disclosure is only that of a range, not a specific temperature in that range, and the disclosure of a range is no more a disclosure of the end points of the range than it is of each of the intermediate points. Thus, JP 51-82206 does not disclose a specific embodiment of the claimed temperature range.

[5] The district court also clearly erred in finding that the claimed oxygen to methylene chloride molar ratio of 0.1 to 5.0 percent was disclosed in JP 51-82206. JP 51-82206 discloses an oxygen to methylene chloride ratio of 0.001 to 1.0 percent that overlaps but does not fall within the range of ratios claimed in the '514 patent. Moreover, the disclosure of a 0.001 to 1.0 percent range in JP 51-82206 does not constitute a specific disclosure of 0.1 percent to 5.0 percent, as Great Lakes asserts. Once again, although there is a slight overlap, no reasonable fact finder could determine that this overlap describes the entire claimed range with sufficient specificity to anticipate this limitation of the claim. The ranges are different, not the same. Indeed, the lower end of the ratio in the reference differs by a factor of one hundred from what is claimed. In addition, the disclosure of a 0.001 to 1.0 percent range is not a disclosure of the end points of that range. Thus, there is no anticipation. Because JP 51-82206 does not expressly or inherently disclose the claimed range of ratios, JP 51-82206 does not anticipate claims 1, 2, 6, 7, 9, and 10 of the '514 patent.

Finally, the district court clearly erred in finding that JP 51-82206 inherently discloses

the contact times found in claims 6 and 10 of the '514 patent. Claims 6 and 10 require that the "gas phase mixture of methylene chloride, anhydrous hydrogen fluoride and oxygen is in contact with the catalyst for a time between 0.01 and 10 seconds." '514 patent, col. 8, ll. 6-11. Those contact times are not expressly found in JP 51-82206. Nor has Great Lakes shown that the contact times are inherently disclosed in JP 51-82206. The calculations Great Lakes points to as inherently disclosing the contact times are based on the first and second examples in JP 51-82206, which state the diameters and lengths of the reaction tubes and the flow rates, but do not say anything about any contact times. Because anticipation by inherent disclosure is appropriate only when the reference discloses prior art that must necessarily include the unstated limitation, JP 51-82206 cannot inherently anticipate the claims of the '514 patent. *Transclean Corp. v. Bridgewood Servs., Inc.*, 290 F.3d 1364, 1373 [62 USPQ2d 1865] (Fed. Cir. 2002). We therefore conclude that the district court clearly erred in determining that the contact times in claims 6 and 10 are disclosed in JP 51-82206.

Because the district court clearly erred in finding that JP 51-82206 discloses the temperature range, the range of oxygen to methylene chloride molar ratios, and the contact times claimed in the '514 patent, we reverse the district court's finding of anticipation.

### III. Inequitable Conduct

On appeal, Atofina argues that the district court abused its discretion in its holding of inequitable conduct because the full English translation of JP 51-82206 that was not submitted to the PTO was not highly material and there was no basis for inferring an intent to deceive the PTO. According to Atofina, the court's sole basis for finding that the English translation of JP 51-82206 was highly material was that the reference anticipated several claims of the '514 patent (its materiality for obviousness purposes was not decided). Thus, Atofina contends that because the court's determination as to anticipation was clearly erroneous, the finding of materiality is also erroneous. As to intent, Atofina also contends that the court failed to consider evidence of good faith, such as Atofina's reference in the prosecution history to page numbers of the full translation of JP 51-82206. Atofina notes that the Derwent Abstract of JP 51-82206 was

disclosed to the examiner and JP 51 was cited in the patent specification.

Great Lakes responds that the court's findings of a high level of materiality and intent were supported by clear and convincing evidence, and thus the court concluded that the '514 patent was unenforceable. Great Lakes argues that the full English translation of JP 51-82206 was highly material because it was anticipatory and it teaches of a pure chromium catalyst. Great Lakes points out that Atofina's application for a European counterpart to the '514 patent was rejected for lack of novelty over JP 51 and issued only after Atofina amended its claims to include an additional limitation. According to Great Lakes, the prosecution history of the '514 patent demonstrates the materiality of the full translation of JP 51-82206. In addition, Great Lakes argues that Atofina acted with intent to deceive the PTO in failing to disclose the English translation of JP 51-82206, characterizing prior art references, and withholding information regarding the pilot phase testing of the patent process. Great Lakes also contends there was no evidence of good faith on Atofina's part in its failure to disclose the full translation of JP 51-82206.

We agree with Atofina that the district court abused its discretion in its conclusion of inequitable conduct. "A patent rendered unenforceable for inequitable conduct if an applicant, with intent to mislead the examiner, fails to disclose material information or submits materially false information to the PTO during prosecution." *Digital Control, Inc. v. Charles Mac*, 437 F.3d 1309, 1313 [77 USPQ2d 1818] (Fed. Cir. 2006). "The party asserting inequitable conduct must prove a threshold level of materiality and intent by clear and convincing evidence." *Id.* Further, "materiality does not require intent, which is a separate and distinct component of inequitable conduct." *v. Franklin Corp.*, 265 F.3d 1268, 1274 [50 USPQ2d 1141] (Fed. Cir. 2001). *Manville Sales Corp. v. Paramount*, 917 F.2d 544, 552 [16 USPQ2d 1515] (Fed. Cir. 1990).

[6] The issue here is whether Great Lakes proved intent by clear and convincing evidence. The district court inferred intent from the applicants' failure to disclose the

es found in claims 6 and 10 of . Claims 6 and 10 require that mixture of methylene chloride, rogen fluoride and oxygen is in e catalyst for a time between onds." '514 patent, col. 8, ll. ontact times are not expressly -82206. Nor has Great Lakes : contact times are inherently P 51-82206. The calculations ints to as inherently disclosing es are based on the first and es in JP 51-82206, which state nd lengths of the reaction tubes ates, but do not say anything act times. Because anticipation isclosure is appropriate only rence discloses prior art that ly include the unstated limita- 06 cannot inherently anticipate the '514 patent. *Transclean ewood Servs., Inc.*, 290 F.3d 2 USPQ2d 1865] (Fed. Cir. efore conclude that the district erred in determining that the 1 claims 6 and 10 are disclosed

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#### able Conduct

Atofina argues that the district s discretion in its holding of in- luct because the full English IP 51-82206 that was not sub- TO was not highly material and asis for inferring an intent to TO. According to Atofina, the sis for finding that the English IP 51-82206 was highly mate- ie reference anticipated several '514 patent (its materiality for rposes was not decided). Thus, ds that because the court's de- to anticipation was clearly er- nding of materiality is also er- intent, Atofina also contends failed to consider evidence of h as Atofina's reference in the story to page numbers of the of JP 51-82206. Atofina notes nt Abstract of JP 51-82206 was

disclosed to the examiner and JP 51-82206 was cited in the patent specification.

Great Lakes responds that the district court's findings of a high level of materiality and intent were supported by clear and convincing evidence, and thus the court correctly held that the '514 patent was unenforceable. Great Lakes argues that the full English translation of JP 51-82206 was highly material because it was anticipatory and it teaches the use of a pure chromium catalyst. Great Lakes also points out that Atofina's application for a European counterpart to the '514 patent was rejected for lack of novelty over JP 51-82206, and issued only after Atofina amended its claims to include an additional limitation. According to Great Lakes, the prosecution of the European counterpart to the '514 patent is evidence of the materiality of the full English translation of JP 51-82206. In addition, Great Lakes argues that Atofina acted with intent to deceive the PTO in failing to disclose the full English translation of JP 51-82206, mischaracterizing prior art references, and also withholding information regarding poor results during the pilot phase testing of the '514 patent process. Great Lakes also contends that there was no evidence of good faith by Atofina in its failure to disclose the full English translation of JP 51-82206.

We agree with Atofina that the district court abused its discretion in its conclusion that inequitable conduct occurred. "A patent may be rendered unenforceable for inequitable conduct if an applicant, with intent to mislead or deceive the examiner, fails to disclose material information or submits materially false information to the PTO during prosecution." *Digital Control, Inc. v. Charles Mach. Works*, 437 F.3d 1309, 1313 [77 USPQ2d 1823] (Fed. Cir. 2006). "The party asserting inequitable conduct must prove a threshold level of materiality and intent by clear and convincing evidence." *Id.* Further, "materiality does not presume intent, which is a separate and essential component of inequitable conduct." *GFI, Inc. v. Franklin Corp.*, 265 F.3d 1268, 1274 [60 USPQ2d 1141] (Fed. Cir. 2001) (quoting *Manville Sales Corp. v. Paramount Sys., Inc.*, 917 F.2d 544, 552 [16 USPQ2d 1587] (Fed. Cir. 1990)).

[6] The issue here is whether Great Lakes proved intent by clear and convincing evidence. The district court inferred intent from the applicants' failure to disclose the full En-

glish translation of JP 51-82206 and its alleged mischaracterizations of that reference. However, the applicants' failure to disclose the full English translation of JP 51-82205 is not in and of itself enough to infer intent, even if the full English translation went beyond the Derwent Abstract, which is far from clear. *See Semiconductor Energy Lab. Co. v. Samsung Elecs. Co.*, 204 F.3d 1368, 1378 [54 USPQ2d 1001] (Fed. Cir. 2000). ("The duty at issue in this case is the duty of candor, not the duty of translation."). "Intent to deceive can not be inferred solely from the fact that information was not disclosed; there must be a factual basis for a finding of deceptive intent." *Hebert v. Lisle Corp.*, 99 F.3d 1109, 1116 [40 USPQ2d 1611] (Fed. Cir. 1996).

The district court's finding of intent additionally rests on three statements made by the applicants to the PTO: (1) the applicants' statement that JP 51-82206 discloses a catalyst containing "chiefly chromium oxide and optionally other metal oxides"; (2) the applicants' statement that a "person skilled in the art, who is looking for a means of fluorinating a specific H containing halocarbon ( $\text{CH}_2\text{Cl}_2$ ) with good selectivity is therefore not prompted to consider the teachings of . . . JP 51-82206"; and (3) the applicants' statement that "[t]hese specific process conditions effect a contact time of 10 seconds or less . . . . The short contact time is not taught in the applied references. Contact time indicated in the references are substantially in excess of this." *Opinion*, slip op. at 64-65 (emphasis in original). The court determined that the first statement misrepresented to the PTO that JP 51-82206 failed to disclose a catalyst of pure chromium oxide, the second statement mischaracterized JP 51-82206 by failing to identify that methylene chloride was a preferred starting material in that reference, and the third statement mischaracterized JP 51-82206 by failing to mention the inherent "contact times" allegedly disclosed in JP 51-82206.

We conclude that the district court clearly erred in finding that these three statements were sufficient to prove intent. First, the applicants' statement that JP 51-82206 discloses a catalyst containing "chiefly chromium oxide and optionally other metal oxides" is consistent with the text of the full English translation of JP 51-82206, which asserts that its catalyst is "mainly comprising chromic oxide." And the Derwent Abstract that was dis-

closed to the PTO also states that the catalyst is "mainly comprising trivalent chromium oxide." "Mainly" and "chiefly" are words with similar meanings. Thus, there was no real difference between the disclosed Derwent Abstract and the undisclosed full English translation of JP 51-82206 in this context.

While the dissent states that "some parts of the majority opinion appear to hold there was no misdescription because JP 51-82206 does not disclose pure chromium oxide," that is incorrect. JP 51-82206 does disclose the use of a catalyst containing pure chromium oxide, JP 51-82206 at 4 ("Not only pure  $\text{Cr}_2\text{O}_3$  but also chromium oxides mainly comprising  $\text{Cr}_2\text{O}_3$  are usable in the present invention."), and we do not state otherwise. Moreover, characterizing a catalyst, as Atofina did, as containing "chiefly chromium oxide and optionally other metal oxides" is not inconsistent with it possibly being pure chromium oxide. Further, the dissent states that "chiefly chromium oxide" does not mean "chiefly  $\text{Cr}_2\text{O}_3$ " because "JP 51-82206 clearly used the term 'chromium oxides' to include oxides other than  $\text{Cr}_2\text{O}_3$ ." While the language "chiefly chromium oxide" does encompass chromium oxides other than  $\text{Cr}_2\text{O}_3$ , it expressly discloses  $\text{Cr}_2\text{O}_3$ . Therefore, no reasonable fact finder could conclude that the applicants misrepresented to the PTO that JP 51-82206 failed to disclose a catalyst of pure chromium oxide. Because the applicants' statement was consistent with both the full English translation of JP 51-82206 and the Derwent Abstract, the district court clearly erred in finding that it supported an inference of intent.

Second, the applicants' statement that a "person skilled in the art, who is looking for a means of fluorinating a specific H containing halocarbon ( $\text{CH}_2\text{Cl}_2$ ) with good selectivity is therefore not prompted to consider the teachings of ... JP 51-82206" was not an omission of the fact that the preferred starting material in JP 51-82206 was methylene chloride. The seven starting materials disclosed in JP 51-82206, including methylene chloride, are disclosed in the first column of the '514 patent, '514 patent, col. 1, ll. 58-59. The applicants also stated to the examiner that JP 51-82206 "mentions, among the reactions, the fluorination of  $\text{CCl}_4$ ,  $\text{CHCl}_3$ ,  $\text{CH}_2\text{Cl}_2$  [methylene chloride],  $\text{CCl}_3\text{F}$ ,  $\text{C}_2\text{Cl}_6$ ,  $\text{C}_2\text{Cl}_4$ , and  $\text{C}_2\text{H}_3\text{Cl}_3$ " and that the "preferred starting materials contemplated [in JP 51-82206] ...

include perhalogenated molecules as well as H containing molecules," which include methylene chloride. Based on the record, we conclude that the district court clearly erred in finding that the applicants' statement was an attempt to hide the fact that methylene chloride was a preferred starting material in JP 51-82206.

Third, the applicants' statement that "[t]hese specific process conditions effect a contact time of 10 seconds or less ... The short contact time is not taught in the applied references. Contact time indicated in the references are substantially in excess of this" does not support an inference of an intent to deceive. As discussed previously, JP 51-82206 does not disclose any "contact times." Therefore, the district court clearly erred in finding that applicants' statement was misleading.

Thus, because the district court clearly erred in its findings of fact relating to an intent to deceive the PTO, we conclude that its holding of inequitable conduct based on those findings was an abuse of discretion. We therefore reverse that holding. Inasmuch as we reverse on intent, we do not discuss materiality.

We have considered the parties' remaining arguments and find them unpersuasive.

### CONCLUSION

We affirm the district court's conclusion of no literal infringement. The district court, however, clearly erred in finding that JP 51-82206 was an anticipatory reference meeting all the limitations of claims 1, 2, 6, 7, 9, and 10 of the '514 patent and also clearly erred in finding that Atofina intended to deceive the PTO so as to support a determination of inequitable conduct. We therefore affirm the court's judgment of no literal infringement, and we reverse its holdings of invalidity because of anticipation and unenforceability for inequitable conduct.

### AFFIRMED IN PART AND REVERSED IN PART.

**Dyk, J., concurring in part and dissenting in part.**

I join the court's opinion insofar as it affirms the district court's finding of no literal infringement and reverses as to invalidity. I also agree that the district court's inequitable conduct determination cannot stand. In my view, that determination rests on an erroneous finding of materiality based on a finding that

JP 51-82206 anticipated claims 1 and 10 of the '514 patent. I would remand this issue so that the district court reconsider the inequitable conduct of this error. In my view the majority deciding to reverse without remand

The majority does not address materiality, but reverses the district court's equitable conduct determination. I remand this issue so that the district court's finding was clearly erroneous. I do not dissent from the majority's determination that the court's second and third grounds of inequitable conduct were clearly erroneous. However, the question on the issue of intent is not whether the applicants misdescribed JP 51-82206 as disclosing "containing chiefly chromium oxide and optionally other metal oxides" as opposed to disclosing JP 51-82206 as disclosing "chromium oxide catalyst." (If it did disclose chromium oxide it would be highly material to the prosecution of this patent, not anticipatory.) Some parts of the majority opinion appear to hold that there was no misdescription because JP 51-82206 disclosed pure chromium oxide and that it accurately stated that it contained chromium oxide and optionally other oxides."

The district court stated that "the specification specifies that the chromium catalyst be 'pure' chromium oxide or chromium oxide." *Atofina v. Great Lakes Chemical Corp.*, Civ. No. 02-1250, slip op. (Feb. 23, 2005); see also *id.* at 42. The district court's finding that JP 51-82206 discloses pure chromium oxide is supported by the text of the specification, which states:

The  $\text{Cr}_2\text{O}_3$  catalyst usable in the present invention can be prepared by the following processes ... [Describing calcination processes].  $\text{Cr}_2\text{O}_3$  prepared by these processes is particularly preferred. *prepared by these processes is it contains a small amount of chromium oxides and has an atomic O/Cr of about 1.4 to 1.7. Not only  $\text{Cr}_2\text{O}_3$  but also chromium oxides comprising  $\text{Cr}_2\text{O}_3$  are usable in the present invention.* A metal oxide other than chromium oxide such as an alkaline earth oxide can be added to the catalyst as another constituent.



perhalogenated molecules as well as containing molecules," which include ethylene chloride. Based on the record, we find that the district court clearly erred in finding that the applicants' statement was an attempt to hide the fact that methylene chloride was a preferred starting material in JP 51-

Further, the applicants' statement that the specific process conditions effect a contact time of 10 seconds or less ... The contact time is not taught in the applied claims. Contact time indicated in the references are substantially in excess of this" do not support an inference of an intent to deceive. As discussed previously, JP 51-82206 does not disclose any "contact times." Therefore the district court clearly erred in finding the applicants' statement was misleading. Further, because the district court clearly erred in its findings of fact relating to an inequitable conduct based on those facts, we reverse that holding. Inasmuch as we reverse that holding, we do not discuss materiality. We have considered the parties' remaining arguments and find them unpersuasive.

## CONCLUSION

We affirm the district court's conclusion of patent infringement. The district court, however, clearly erred in finding that JP 51-82206 was an anticipatory reference meeting the limitations of claims 1, 2, 6, 7, 9, and 10 of the '514 patent and also clearly erred in finding that Atofina intended to deceive the PTO as to support a determination of inequitable conduct. We therefore affirm the district court's judgment of no literal infringement, and reverse its holdings of invalidity based on anticipation and unenforceability for inequitable conduct.

**REVERSED IN PART AND REVERSED IN PART.**

**CONCURRENCE, concurring in part and dissenting in part.**

I concur with the court's opinion insofar as it affirms the district court's finding of no literal infringement and reverses as to invalidity. I dissent from the district court's inequitable conduct determination. That determination cannot stand. In my view, that determination rests on an erroneous finding of materiality based on a finding that

JP 51-82206 anticipated claims 1, 2, 6, 7, 9, and 10 of the '514 patent. I would vacate and remand this issue so that the district court can reconsider the inequitable conduct claim free of this error. In my view the majority errs in deciding to reverse without remand.

The majority does not address the issue of materiality, but reverses the district court's inequitable conduct determination on the ground that the district court's intent finding was clearly erroneous. I do not disagree with the majority's determination that the district court's second and third grounds for finding intent were clearly erroneous. However, a key question on the issue of intent was whether the applicants misdescribed JP 51-82206 by stating that JP 51-82206 disclosed a catalyst "containing chiefly chromium oxide and optionally other metal oxides" as opposed to describing JP 51-82206 as disclosing a pure chromium oxide catalyst. (If it disclosed pure chromium oxide it would be highly material to the prosecution of this patent, even though not anticipatory.) Some parts of the majority opinion appear to hold that there was no misdescription because JP 51-82206 does not disclose pure chromium oxide and the applicants accurately stated that it contained "chiefly chromium oxide and optionally other metal oxides."

The district court stated that "JP 51-82206 specifies that the chromium catalyst can either be 'pure' chromium oxide or mainly chromium oxide." *Atofina v. Great Lakes Chem. Corp.*, Civ. No. 02-1250, slip op. at 4 (D. Del. Feb. 23, 2005); see also *id.* at 42. The finding that JP 51-82206 discloses pure chromium oxide is supported by the text of JP 51-82206 which states:

The Cr<sub>2</sub>O<sub>3</sub> catalyst usable in the present invention can be prepared by various processes ... [Describing calcinations processes]. Cr<sub>2</sub>O<sub>3</sub> prepared by calcining a chromium compound containing chromium hydroxide is particularly preferred. Cr<sub>2</sub>O<sub>3</sub> prepared by these processes is not pure but it contains a small amount of other chromium oxides and has an atomic ratio of O/Cr of about 1.4 to 1.7. Not only pure Cr<sub>2</sub>O<sub>3</sub> but also chromium oxides mainly comprising Cr<sub>2</sub>O<sub>3</sub> are usable in the present invention. A metal oxide other than chromium oxide such as an alkaline earth metal oxide can be added to the catalyst as another constituent.

J.A. 3037 (emphasis added). While JP 51-82206 may not disclose the use of pure Cr<sub>2</sub>O<sub>3</sub>, it certainly discloses the use of pure "chromium oxides" without the presence of other metals, as is required by the '514 patent.<sup>1</sup>

What a prior art reference discloses or teaches is a question of fact. *Novo Nordisk Pharm., Inc. v. Bio-Tech. Gen. Corp.*, 424 F.3d 1347, 1355 [76 USPQ2d 1811] (Fed. Cir. 2005); *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 [53 USPQ2d 1580] (Fed. Cir. 2000). On this record, I see no basis for disturbing the district court's factual finding that JP 51-82206 disclosed "pure" chromium oxide.

The majority ultimately agrees that JP 51-82206 does disclose pure chromium oxide, but nonetheless concludes that the description in JP 51-82206 is not misleading. I cannot agree. The district court found as a factual matter that Atofina, which was in possession of a full-length English translation of JP 51-82206, misrepresented this aspect of the Japanese patent to the PTO. In the '514 patent, and in representations to the PTO, Atofina described JP 51-82206 as claiming a catalyst "containing chiefly chromium oxide and optionally other metal oxides." J.A. 1129 at 1:48-49 (emphasis added). The district court determined that Atofina's use of the term "chiefly" was misleading in that it implied that the Japanese patent only disclosed a chromium catalyst which included other components, rather than disclosing a catalyst containing chromium oxides. *Atofina*, Civ. No. 02-1250, slip op. at 64. The majority rejects the district court's interpretation, stating that "characterizing a catalyst, as Atofina did, as containing 'chiefly chromium oxide and optionally other metal oxides' is not inconsistent with it possibly being pure chromium oxide." Maj. Op. at 20 (emphasis added). The majority thus appears to hold that the description is not misleading because it is not a direct mis-

<sup>1</sup> Atofina appears to argue that "chiefly chromium oxide"—which is how it described the catalyst disclosed in JP 51-82206—means "chiefly Cr<sub>2</sub>O<sub>3</sub>." This is misleading. Chromium oxide is "[a] compound of chromium and oxygen; chromium may be in the +2, +3, or +6 oxidation state." *McGraw-Hill Dictionary of Scientific and Technical Terms* 390 (6th ed. 2003); see also *Van Nostrand's Scientific Encyclopedia* 787 (9th ed. 2002) (describing "[t]he three oxides of chromium" as "CrO, Cr<sub>2</sub>O<sub>3</sub>, and CrO<sub>3</sub>"). Further, JP 51-82206 clearly used the term "chromium oxides" to include oxides other than Cr<sub>2</sub>O<sub>3</sub>.

statement. I fail to see how the majority can rule as a matter of law that the district court could not find that Atofina's reference is misleading because of the implication that it conveys. See *Semiconductor Energy Lab v. Samsung Elecs. Co.*, 204 F.3d 1368, 1377 [54 USPQ2d 1001] (Fed. Cir. 2000) (affirming a finding of inequitable conduct where the patentee submitted a one-page, partial translation of a foreign reference because the partial translation focused "on less material portions" and "left the examiner with the impression that the examiner did not need to conduct any further translation or investigation"). In context, the withholding of information that JP 51-82206 did *in fact* disclose pure chromium oxide could itself support a finding of intent.

Under these circumstances, it is possible that the district court could properly find intent in connection with this withholding of JP 51-82206. I would afford the district court the opportunity to reconsider its inequitable conduct determination.

# On Demand Machine Corp. v. Ingram Industries Inc.

U.S. Court of Appeals  
Federal Circuit

Nos. 05-1074, -1075, -1100

Decided March 31, 2006

## PATENTS

### [1] Patent construction — Specification and drawings — Defining terms (§ 125.1103)

#### Patent construction — Claims — Broad or narrow (§ 125.1303)

Term "sales information," as used in claim for system and method of manufacturing single copy of book in response to customer's request, is properly construed to mean information that is promotional in nature, and does not encompass identifying information such as title, author, or International Standard Book Number alone, since specification makes clear that sales information is that which would help consumer choose book, and identifies "descriptive material such as a synopsis, plot, or author's biographical summary, etc." as

promotional information, since prosecution history requires such construction, in that inclusion of promotional information was material distinction from prior art, and since ISBN, title, and author are file identifiers, not promotional information.

### [2] Patent construction — Specification and drawings — Defining terms (§ 125.1103)

#### Patent construction — Claims — Broad or narrow (§ 125.1303)

Patentee need not expressly disavow standard dictionary meaning of claim term in order to limit scope of claim if scope is clearly stated in specification, and is described as advantage and distinction of invention; in present case, scope of term "customer," as used in claim for system and method of manufacturing single copy of book in response to customer's request, is limited to retail consumer, even though patentee did not explicitly disavow different scope for term, since patent specification repeatedly reinforces usage of term "customer" as retail consumer, since claims cannot be of broader scope than invention set forth in specification, and since focus of patent is immediate, single-copy printing and binding initiated by customer and performed at customer's site.

### [3] Infringement — Construction of claims (§ 120.03)

#### Infringement — Literal infringement (§ 120.05)

#### Patent construction — Claims — Means (§ 125.1307)

Limitation in claim for system and method of manufacturing single copy of book in response to customer's request, which requires "providing means for a customer to visually review" sales information, is not met by infringement defendants' book sales methods, since defendants do not provide computers to customers, whereas claimed invention requires that bookseller "provide" customer with computer for use in unified browsing/ordering/printing system.

### [4] Patent construction — Specification and drawings — Defining terms

### (§ 125.1103)

#### Patent construction or narrow (§ 125

"Printing on paper claim for system and ing single copy of bo tomer's request is limi vidual pages, and does on webs or continuou quently cut into pages, scribes invention only vidual pages, as distin setting" with producti and since claimed inve site binding and printi which printing on large of cutting to page size ment and procedures in invention.

### [5] Patent construct Broad or narrow

Phrase "high speed copy of a book," in pre tem and method of ma of book in response limits claim to subject preamble states fran which is directed to rap of customer's selected manufacture of single mental to claimed inve specification, which nc have printed and bounc five minutes," and si implements preamble's ture of single copy, d view of stored sales in prompt printing and bi response to customer's

### [6] Infringement — C (§ 120.03)

#### Infringement — (§ 120.05)

No reasonable jury c system and method of copy of book in respo request is infringed by production of books fo ers from remote locati precept of claimed in printing and binding o



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